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ABSTRACT

This paper describes how one graduate student in a master's degree program for mathematics teachers moved from a state of confusion and anxiety to confidence in herself as a teacher researcher via a three-way collaboration among the teacher, her university professor, and her school supervisor. The second semester of her year-long Research in Education course was spent researching, analyzing, and interpreting data for her research project. The success of her project and her transformation to a classroom researcher was due to several factors within this collaboration. First, in the beginning, she was the "middle person" trying alone to negotiate a deal enabling her to satisfy course requirements and fulfill her responsibility as a teacher. Things became easier when she, the professor, and the supervisor communicated directly to clarify what she needed to do and how she could work this into her real work day, thus connecting the academic to the practical in a concrete way. Second, through the collaboration, she gained enough confidence to examine her own teaching and make it the object of her investigation, rather than simply the method of her formal research. Finally, they all learned that to disagree, then come to consensus, was critical to developing research ideas for the classroom. (SM)

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Developing Teachers as Researchers: A Collaborative Approach

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Developing Teachers as Researchers: A Collaborative Approach

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Teaching teachers to become researchers is something like teaching children to ride bicycles. Both involve using skills and knowledge that are already in their possession, but combined in new ways. In the case of bicycle riding, skills such as pedaling a tricycle and keeping one's balance while moving may be mastered, but children need guidance to help them expand and coordinate these activities in the service of a new application, riding a "two-wheeler." Teachers are in a similar position regarding their use of a research process for examining and reporting on their classroom practices. They already have many questions about what they are doing as teachers, along the lines of "Does it work?" "Why does this happen?" "What is the best way to...?" Similarly, they are engaged in collecting data on student performance in the form of projects, tests, journal entries, and the like. However, they rarely, of their own accord, put their questions and their data together so that one can inform the other. For many teachers, research and classroom practices are seen as two completely separate and uncoordinated processes (Cochran-Smith & Lytle, 1990; Graham & Webb, 1992). To bridge this gap, teachers need to expand their vision of what doing research means by taking gradual steps in a fail-safe context. At the same time, each step needs to be integrated into a "bigger picture," one that the teacher can eventually envision on her own.

Recently, there have been many efforts made to involve teachers directly in the research process, most specifically in action research projects (Cochran-Smith & Lytle,

1999). In most of these cases, we find teachers who are either intrinsically motivated to do classroom explorations (Nevarez-LaTorre, (1999), or more commonly, teachers who are encouraged and even required to engage in the process because of administrative mandates (Henson, 2001; Francis, Hirsch, S, & Rowland, 1994)). Teacher-researchers who are engaged in the process of classroom research as graduate students, however, constitute a somewhat different population and present an especially challenging task for their mentors. These teachers often begin the process as a course requirement in which they feel they have no personal investment beyond meeting a professor's expectations. They work only with a university professor (Raymond & Leinenbach, 2000; Potari & Jawarski, 2002), often in contexts in which there is no connection between the teacher's "real work and professional affiliations within the school" or between the university's more academic approach to research and the school's needs (Knight, Wiseman, & Smith, 1992).

To overcome these obstacles to successful teacher-research among teachers who are doing research as part of a graduate degree requirement, it is necessary to provide an extremely supportive mentoring system through which these teachers can expand their vision of what doing research means to them in their own work contexts. Then it is necessary to take them gradually through the necessary research-building steps in a fail-safe way with connecting support from university and school mentors.

This presentation describes how one such teacher-researcher moved from a state of confusion and anxiety to confidence in herself as a teacher-researcher by means of a three-way collaborative effort among the teacher, her university professor, and her school supervisor.

The Process

Kathie was a graduate student in a master's degree program for mathematics teachers at William Paterson University. She was, and still is, a high school mathematics teacher in New Jersey. As part of her master's program requirements, Kathie had to participate in a year-long *Research in Education* course, taught by Rochelle, her college professor, for the purpose of developing a 5-chapter research-based master's thesis. The first semester of this course is spent in defining a research problem and questions, reviewing research literature related to that problem, and planning a hands-on classroom intervention to address the research questions. The second semester is then spent conducting the research, collecting data, and then analyzing and interpreting the meaning of those findings. Each of the tasks represents one full chapter in the final master's thesis product.

Kathie began this project with an initial misconception about what the task entailed. When she entered the course, she believed that she would be doing a library research paper in which she would have to gather information about studies done by other people and then write about them in a summary paper. As Kathie said,

> "I thought I was going to have to write a paper and that was it. Research something and write a paper. Just pick a central interest, like in my case I was thinking calculators. So I thought I would just have to research how you use calculators in the classroom, like look for articles in magazines or professional journals, with activities that somebody else had done."

When she found out that this part of the task was only a component of her thesis and that she would actually have to conduct a research project in her own classroom, she experienced a great deal of trepidation. In an attempt to calm herself, she translated "classroom research" to her existing view of what "doing research" entailed. In this view,

research could be only one thing, a traditional experimental model with a control group, an experimental group, and an artificial laboratory-like intervention. This resulted in even greater stress for Kathie because she was unable to see how this notion could fit into her role as a teacher. She believed that she had to cover her curriculum in the way she always did and that, consequently, she could not set up an experimental laboratory situation in her classroom as well. She held strongly to a feeling that 'the powers that be' would never let her interrupt her existing routines and that her supervisor would not approve any plans that deviated from established practice.

Kathie's beliefs kept her locked into a fruitless search for research questions during which she kept coming up with variations of a single theme, the use of calculators and their effect on achievement on some specific assessment. For example, she posed research questions such as: "What is the impact of calculator usage on multi-step problem solving in a pre-algebra class?" and "How does the use of technology affect the retention and application of Algebra II concepts as opposed to learning these skills solely with a textbook?" Essentially she was working from her conception of a traditional cause-effect model of experimental research in which doing something to students directly impacts on some quantitatively measurable performance task. However, Kathie had no rationale for why she wanted to consider these particular variables or a technology-based teaching intervention in general. Therefore, her attempts to generate significant research questions, find relevant related studies, and state the underlying educational issue motivating her particular research questions were not successful.

Thus, while her college professor was trying to get Kathie to think about larger researchable issues related to her teaching, Kathie kept trying to do what she thought was

required as course assignments. She really did not understand Rochelle's point of view and did not seem to understand that she would not have a research topic until she had some reason for speculating about the relationships she was suggesting for her study. Her school supervisor, Sandy, later referred to this as Kathie's failure to "have a vision" about teaching and learning that went beyond simply fulfilling her responsibilities and collecting test score data.

At this point Kathie's in-class communications and email exchanges with the professor reflected a very deep divide between their world views. For example, Kathie emailed this query:

> "Dr. Kaplan,
> I'm still having trouble coming up with a topic for my thesis. I was thinking about the following:
> *The effects of calculator usage on the comprehension of selected concepts in the average ability Algebra II student.*
> I'm not sure if I'm supposed to eliminate the "selected topics" or be more specific. Also, am I supposed to say what effect I'm looking for? I have looked at several studies over the past week that have involved using calculators, but I have not found them helpful in formulating a research topic. I am sure that I want to research this general idea of calculator usage in the classroom (more specifically the graphing calculator), but I don't want to do a lot of looking and then find out that it is not something that you think is doable."

In trying to clarify her meaning, Rochelle responded with:

> "Kathie, you need to focus on broader issues. ...For example, there are problems in implementing the national and regional standards as you face real-world implementations such as teaching students who lag behind. There are other issues such as how valid are existing assessments and do they really reflect what students are capable of doing? ...Broader issues tell why you want to answer the question you pose. You need to think about what is important about your question. Why does finding the answer matter beyond fulfilling an assignment for this course?"

Shortly after that, Kathie emailed Rochelle with:

> "Dr. Kaplan,
> .....After speaking with you last night I am even more unsure of what my thesis is supposed to be. I know that many people in the class are doing

> problem based learning, but I am definitely not interested in that. I did like the research that I did in the summer regarding motivating the uninvolved learner, but honestly, we didn't find much, and most of what we did find was not really suitable for high school. You had also mentioned my work as Dr. Math, but I wasn't really sure if you meant for me to think about doing something along those lines. I really can't even think about where or what I would look for in regard to that activity. I feel as if I'm being a pain, but yes, I am getting a little worried about not knowing what I am doing. It goes against my nature to be totally unprepared, which is how I feel at this time."

Because Kathie remained focused on doing an assignment and pleasing the professor rather than on generating research issues and questions, she kept trying to address implementation problems instead of conceptual problems. She was also trying to 'get it right' and wanted the professor to tell her specifically what to do. This made the situation particularly stressful for both of them, especially since Kathie was concerned about pleasing her school supervisor, Sandy, as well. Kathie made it very clear that she believed her school supervisor would not approve any of the possible directions that the professor suggested to her because, in Kathie's view, they interfered with the dutiful performance of her existing role as a teacher. Kathie even reported that during her conversations with her school supervisor she was told she could not do the interventions that she and her professor had previously considered. In fact, this interpretation was not quite accurate, but because Kathie could only communicate about the requirements from her point of view, she was unable to make Sandy understand what the college supervisor was actually suggesting.

The outcome during this first phase from January to late March, therefore, was that Kathie did not have a viable topic for her research and did not have any reasonable research questions that both she and the professor could both accept. Most disheartening

was that Kathie and her professor were getting angry with one another because they were unable to get beyond their impasse.

What happened next was somewhat fortuitous, but could have happened by design. In a casual conversation, Rochelle learned that Kathie's school supervisor was Sandy, someone known to her and who was teaching in the graduate program as an adjunct instructor. It was natural for Sandy and Rochelle to be in touch with one another to discuss the realities of Kathie's teaching situation, what the important issues in her teaching situation were, and what Kathie could do within the constraints of that situation for her research project. Most important for Kathie, was their discussion about how the requirements for her master's thesis could fit into her school-based research.

From this point on, they established a three-way communication network, although the three of them never met together. Kathie spoke to Rochelle, Rochelle spoke to Sandy, Sandy spoke to Kathie, Kathie spoke to Rochelle, and so on. This connection was critical to the success of Kathie's project. As Kathie observed:

> "Once my professor started talking to my supervisor, and my supervisor started talking to me, I started talking to my professor... once the three of us actually connected and formed this triangle, it became a much more doable project. I knew what they each wanted and I could see how to go about doing it. That's when it started to gel and get worked out."

Similarly, Sandy observed:

> "Things did not really start working out until the Rochelle and I spoke to one another and tried to find a common ground. Once we spoke, it was clear to me what was expected of Kathie and I was able to talk to her and help her focus on what we could do at the school to satisfy the course requirements. That was when we decided to have her teach two or three classes in the same subject matter, but each with somewhat different techniques. This was a fairly traditional approach to research and this was what Kathie was prepared to do from the beginning. What I was able to do was give Kathie a course schedule that would enable her to carry out her program within the framework of her regular teaching schedule."

Sandy also observed that she found that Kathie got over her block about doing classroom research when she realized that her school supervisor understood what she had to do and was able to give her the teaching conditions under which she was be able to carry out her research. She felt that it was very important to Kathie that she had someone in her school who "bought into the plan." As a teacher, Kathie needed to feel confident that if anything went wrong, for example if there were any parent complaints about unfair treatment, that her supervisor would back her up and that she, the teacher, would not get criticized or penalized in any way.

Through the three-way communication, Sandy and Rochelle were able to broaden Kathie's concept of classroom research so that it was integrated with her regular teaching format and curriculum. They noted that before their three-way dialogues started taking place, Kathie did not connect her teaching concerns with her thesis research. She had been operating under a false dichotomy of seeing her role as a teacher and her role as a researcher as two different and independent things. They noticed that by bringing these two roles together, Kathie was able to take more ownership of her own research and overcome her strong feeling that she was doing this all as an assignment that had to please them.

As Sandy and Rochelle spoke further together and each of them with Kathie, they learned that Kathie's real interest, as a teacher, was in improving the attitudes toward learning mathematics ***and the performance*** of her lower achieving students, the ones who would take the least challenging math courses in her high school just to fulfill a minimum math requirement for college entry. Kathie had a gut feeling that if she could do something with them, they could become more motivated, more engaged in the classroom, and would complete their homework. She expected that such changes would lead them to greater

success in the mathematics content and be reflected in classroom participation as well as tests and quizzes. Eventually, they all agreed that the big issue and focus of Kathie's research was on getting low performing students to attain higher levels of proficiency and knowledge consistent with national and regional standards. Since Kathie was interested in working with these students and wanted to improve her instruction and their learning, it then seemed logical that her research should involve some teaching innovation that would specifically address the needs of these students. They agreed that Sandy would continue to meet with Kathie to support her research in terms of granting her reasonable program modifications that would enable her to bring a systematic and innovative program to her low achieving students in the coming semester. Ultimately, through this triangular communication system, Kathie developed an excellent strategy for involving her low achieving students in higher level thinking by having them participate in a email communication program using her course website.

Over the course of the rest of the semester and continuing into the following school year, Sandy continued to meet with Kathie to work out the details as they related to her teaching. Following her meetings with Sandy, Kathie conferenced with Rochelle individually and they confirmed and reconfirmed the details of what she would do in terms of the questions that her research would address, how she would collect her data, and what sense she could make of her results in terms of her own teaching practices. Also for the duration of the course year, Rochelle's connection with Sandy continued by phone and by email in which Rochelle shared with her the written progress of Kathie's planning and conceptualizing about the project. Sandy would then put a touch of reality to these plans by focusing on the content of the courses that Kathie would teach and what she could do to

change her methods of instruction. Sandy and Rochelle did find points of real disagreement between them, but together they came to terms on what would be acceptable within the constraints of the school and still meet the requirements of the course and thesis.

A really positive outcome of the three-way collaboration was also that Kathie and Rochelle stopped locking horns and were able to work out a method of productive communication both in class and during their conferences. As the research project and purpose became increasingly clear in Kathie's mind, her resistance to suggestions largely diminished. Most important, knowing that both Sandy and Rochelle were in support of her efforts, she was able to keep up on the step-by-step assignments for the course. If she needed more time to work through segments of her formulation, Rochelle took the pressure off her by allowing as much time as needed and went through as many rewrites as she requested. Sandy went out of her way to provide Kathie with a teaching schedule that would enable her to have several equivalent classes so that she could have some comparison group data to include in her research.

Outcomes for Kathie as a Teacher-Researcher

By the end of the first semester, Kathie began to see the light and understood how the course's mini-assignments were really part of the 'big picture." She also began to be curious about what would happen when she actually carried out her plan. As she observed:

> "I became very interested in seeing how working with students in new ways, having them do something that was not part of their usual 'daily ritual,' would affect their motivation and performance. I really saw an improvement in the students from the start to the finish. They were more open in the classroom. They felt that I was really talking to them when I was emailing them. This seemed to make them more comfortable participating in class. They were less inhibited in what they said. They were not afraid to make mistakes. The were able to try something and if they made a mistake it was alright. Before the study, they were much more reluctant to take a chance at doing something because they were afraid

they would be wrong. I didn't see this right away, but since the study and my thesis have been over, I really noticed it. "

Most important, was Kathie's transformation from a graduate student trying to do an assignment for a professor, to a teacher who had taken enthusiastic ownership of her own research. As Kathy observed after her research was completed:

"Surprisingly, doing the actual research was not so difficult once I got the idea together. I found that the actual classroom research was not so different from what I did before except that I introduced this new email element. That was very time consuming, trying to respond to each student individually, but as I went along, I saw that the students were sending many similar responses. This helped me to develop a few sets of standard responses so that I could give each student appropriate individual feedback, without having to write each one from scratch. I was able to create a kind of rubric for each problem and use standard responses that I could send to certain students based on what they were sending me."

"I also have to say that I have a new respect for anybody that does research. I really didn't think it was this complicated. I had no idea how much work it took to do the research and write about it. I really have a lot of respect for all those people who have written about and published their research."

In the future, Sandy is planning to work with Kathie as a teacher-researcher, without the pressure of having to write up her thesis. This coming year she will assign Kathy to work with two classes of students who are considered at risk, identified as such through tests they have previously been given. They plan to replicate the same basic design that Kathie used for her thesis research. However, this time she will be working not with seniors who were less likely to change, but with freshman who are just beginning in high school and may be helped to develop new ways of relating to their teacher and the math content. They also plan to follow these students the next year to see if the progress they make with Kathie in their freshman year will be carried over later on.

Kathie has been an active part of this planning process and has given substantial thought to how she will continue her research in the future. As she says:

> "I think I will try something like this again, though, but next year with freshmen. I think starting at the beginning would be better. They are new into the school so you have a better chance to get them excited and used to using the system. I know I will have to modify it to make it to make it less time intensive for me, but I will still use the basic format where I post something for them to react to on the class website and they email me about the posting through the website and I get back to them by email through the website. I may use journals or problem of the week with grades. The journals may be less inhibiting for them."

At this point Sandy sees her role as one in which she can help Kathie build more of a vision for herself about her teaching and what she wants to see happening among her students. She thinks that by continuing to support Kathie as a teacher-researcher, it will help her look at her work a little differently. She is considering getting Kathie a teacher-researcher partner so that she will feel more supported and that she can take on more responsibility as a researcher by encouraging another teacher to get involved in this important process. Sandy believes that this will help Kathie develop greater vision about her own teaching and the role that classroom research can play in that process.

Although they hadn't considered continuing the three-way collaboration beyond the time of the thesis course, they may want to extend the "collaborative triangle" by including some less direct support by the college professor in Kathie's further research efforts. This might be done by having the professor help the supervisor expand her own view of what classroom research could entail. Sandy still sees research in a fairly traditional way, requiring at least two groups taught in different ways with the same data collected on both groups in order to make between-group comparisons. This format might be modified by input from the college professor who sees classroom research in a different light, more in

terms of doing teaching innovations with all students and then examining in-depth the observed effects on the students in each class. They also may want to try looking more at differences within classes in terms of how the teaching intervention impacts differently on different students and how Kathie might change her teaching based on her observations rather than looking for precise measurable differences between the groups in terms of quantitatively measured performance outcomes.

Reflections and Recommendations

The success of Kathie's project and her transformation to a classroom researcher was due to several factors related to this three-way collaboration. First, in the beginning, Kathie was the "middle-person," trying alone to negotiate a deal that would enable her to satisfy course requirements and fulfill her responsibility as a teacher. She was bouncing back and forth between her professor and her school supervisor, trying to please them both and not really knowing how to do that. The big break came when Sandy and Rochelle communicated directly with one another so that they could clarify between themselves what Kathie needed to do and how she could work this into her real work day. In doing this they were able to connect the academic to the practical in a very concrete way which really took a burden off Kathie. Also because they all worked together, Kathie was able to relate the more abstract focus of the research course to something specific that was going on in her school. This is not necessarily a natural connection that teachers make on their own. We learned from this that a three-way collaboration between school administrators, the university, and teachers has to be carefully and deliberately orchestrated.

Second, through the collaboration, Kathie gained enough confidence to examine her own teaching and to make it the object of her investigation rather than simply the

method of her formal research. She was able to see herself in a new light. As a graduate student she was able to broaden her conception of research so that it included real classroom practices and reflections on those practices rather than some quasi-experimental intervention or arbitrary manipulation that had no theoretical or practical value. As a teacher, she was able to see that what she did with students was not set in stone, but could be seen as part of an ongoing and evolving process to be scrutinized, evaluated, and changed. Kathie's acceptance of this process and her new meaning for 'research,' is not yet complete, but at least it has begun.

Finally, we all learned that to disagree and then to come to consensus is a critical part of developing research ideas for the classroom. The professor's external perspective was definitely enriched by being able to communicate directly with Kathie's school supervisor. Similarly, not keeping the school supervisor in the dark about the kind of research that is expected of the teacher who is in graduate school was an important part of this process. Without this collaboration, the teacher doing research can feel very isolated in schools where research is not overtly supported. Having the support of her school supervisor made all the difference to Kathie in the acceptance of her role as a researcher of her own practices. So basically, this three-way collaboration made all three participants able to deal with the realities and varied perspectives that need to be accounted for by the teacher-researcher, her university mentor, and her school supervisor so that Kathie's classroom-based research was successful.

In order to make this process replicable, we have a few suggestions about how others may organize a three-way collaboration among the school supervisor, the university professor, and the teacher-researcher. During the initial stage of conceptual development

the professor and teacher need to get to know each other and most particularly for both to make an effort to understand the perspective that each means by research and particularly research done by teachers. They need to come to an understanding about the role of each of them in the development of the project.

After that, it would be most helpful if the teacher went back to the school supervisor to get that person on board in terms of knowing that the teacher would be writing a master's thesis that involved hands-on research and data collection in her own classroom. At this time, the teacher might also mention some of the ideas that had been discussed with the university professor in class.

The next step would be to arrange an introduction between the school supervisor and the university professor. This could be in-person, by phone, or through e-mail. Perhaps a combination of all three would be best. The idea of this coming together is for the professor to let the supervisor know what kind of research is expected of the teacher and to find out about the practical constraints and the needs of the school in relation to that research. At the same time, the meeting should enable the school supervisor to share his or her own ideas about what research means and to be frank about what the teacher involved may or may not be able to do in the school context.

Beyond this point, it would be up to the teacher-researcher to keep in touch with the supervisor and to keep that person informed about each stage of the plan and to get feedback, guidance, as well as a commitment of support on a practical level. The content and outcomes of these discussions would then need to be shared with the college professor. At the same time, the professor and school supervisor would need to communicate about their own perspectives on the progress of the student. This process would be continued

throughout the course of the project, but probably on a decreasing level as the teacher-researcher claims more and more ownership of the research. Upon the completion of the research, the teacher should present the school supervisor with a bound copy of the full thesis along with a formal letter of acknowledgement and appreciation for the support of that person in the collaborative effort. Granting the school supervisor status as a "Clinical Fellow" within the context of the university might also be considered.

Even with university support, though, if we want to get more teachers involved in this process beyond their master's degree requirements, we really need to get more systemic support for teacher researchers at the district level. We would need to have many supervisors getting involved to support the teachers and make the conditions right in the schools for those who want to tackle classroom research either based on their own initiatives or with a collaborative group of colleagues. Without someone in this middle management level to support the teachers, they will not have that much success. Therefore, if districts regard teacher research as important, they will need to provide support and incentives for the supervisors who in turn need to provide support for their teachers. Without this systemic commitment, most teachers in most schools will not become involved despite the importance of teacher research to school success. As Sandy noted:

> "In general, I think teachers doing research in their own classrooms is a great thing and should be done in all grades. The earlier we can identify what is going on in the learning experience and processes of all students, the better students they will be. So I see classroom research as just one more way to improve students' learning."

This view about the power of research in the teaching and learning process certainly needs to be more widespread if we want to increase the number of teacher-researcher communities. A logical place to begin to make this happen might be through an initial

three-way collaboration between a university professor, a teacher, and a school supervisor in support of the teacher's inquiry into her own classroom practices.

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